

Infrared to Visible Upconversion in Er³⁺ Doped Sol-gel Zirconium Oxide Phosphors

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We report efficient upconversion in Er³⁺ doped monoclinic zirconium oxide phosphors. The process is observed under 1.438μm OPO laser excitation and results in the generation of UV-blue (378-407 nm), green (500-560nm), red (670-750nm), and IR (910-970nm) radiation, see Fig. 1. The main mechanism that allows for upconversion appears to be energy transfer among Er³⁺ ions in excited states (1). The life times of the observed upconversion emissions were measured and compared with the ones reported for other hosts (2-4).

Besides the upconversion results here presented, the excellent chemical and photochemical stability of monoclinic zirconium oxide as well as its low phonon energy suggest a large potential of this phosphors in photonic applications (5-7).

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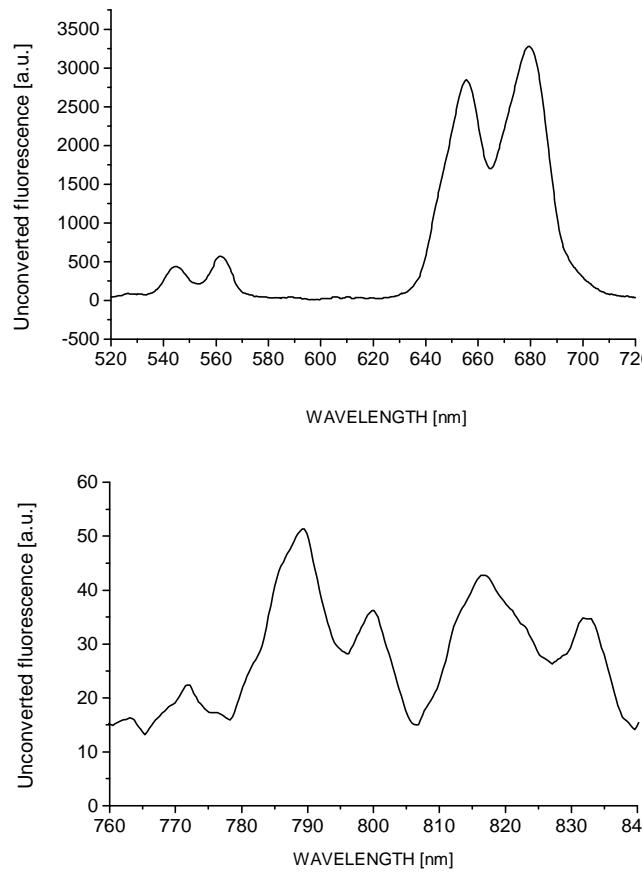


Fig. 1 Upconverted fluorescence of Er³⁺ in monoclinic sol-gel ZrO₂:Er. The excitation wavelength was 1.439μm in resonance with the transition $^4I_{15/2} \rightarrow ^4I_{13/2}$.